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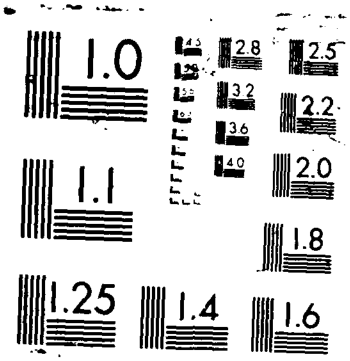
1.0
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FOREIGN TECHNOLOGY DIVISION

COMBINED OPERATION OF TWO IMPULSE-EXCITED OSCILLATORS
WITH ENERGY STORAGE IN THE INDUCTIVE LOAD

By

G. A. Sipaylov, A. V. Loos

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

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A-1

Page 42.

COMBINED OPERATION OF TWO IMPULSE-EXCITED OSCILLATORS WITH ENERGY STORAGE IN THE INDUCTIVE LOAD.

G. A. Sipailov, A. V. Loos.

(It is presented by the scientific seminar of the departments of electrical machines and general/common/total electrical engineering).

Existing diagrams of energy storage from impulse-excited oscillator in inductive load for time of many half-waves emf. one sign they possess the essential deficiency/lack, which consists in the fact that the time of conservation of energy between two cycles of accumulation is sufficiently great. This leads to the considerable energy losses in the effective resistance of duct/contour "load-short" with [1, 2].

Time of conservation of energy between two cycles of accumulation is possible substantially to shorten, if to carry out energy transfer for time of each half-period emf. Most simply it is

possible this to carry out by the use/application of two-phase impulse-excited oscillator, emf. phases of which they are shifted 180 electrical degrees. In this case possibly also the use of two single-phase impulse-excited oscillators, which have the analogous of the phases between emf.

Schematic diagram of work of two single-phase generators of inductive load is given in Fig. 1, where УГ-1, УГ-2 - single-phase generators of striking power, K-1, K-2, K-3 - arc-free ion-mechanical switching devices/equipment, L, r_H, L_r, r_r - parameters of load and generators.

Character of change in currents and emf of generators is shown in Fig. 2. The work of diagram is realized as follows. In the initial state K-1, K-2, K-3 are opened. Generators idle. At the moment of time t = 0 closing/shorting K-1 we realize start of generator УГ-1 of the load.

Character of change in current is determined from solution of equation (1):

$$E_{\Gamma}\sin\omega t \quad L\frac{di}{dt} \quad + L_{H}\frac{di}{dt} + r_{H}i_{H} \qquad (1)$$

At the moment of time t_1, when the current of load reaches maximum,

we produce closing/shorting K-2. The character of a change in the currents in this case is determined by the solution of equations (1), (2) and (3):

$$E_m \sin(\omega t - \pi) = L_r \frac{di_r}{dt} - r_r i_r - L_H \frac{di_H}{dt} + r_H i_H, \qquad (2)$$

$$i_H = i_1 - i_r. \qquad (3)$$

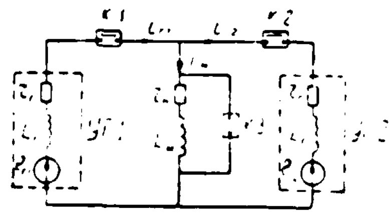

Fig. 1. Schematic diagram of work.

Page 43.

From this point on, of time begins rapid increase of current $i_{г2}$ and reduction in current $i_{г1}$ At the moment of the transition/junction of current $i_{г1}$ through zero is produced interrupting K-1. The current of load in the time interval from t_1 to t_2 remains in effect constant. From the moment/torque of time t_2 transient process in the diagram is described by equation (2). The current of load again grows/rises, and at the moment of achieving its maximum t_3 it is produced closing/shorting K-1. The current of generator $i_{г2}$ rapidly decreases, and at the moment of its transition/junction through zero we produce the cutoff/disconnection of generator УГ-2 with interrupting K-2. At this time the current of generator УГ-1 sharply grows/rises. In the time interval from t_3 to t_4 the current in the load is kept constant, and then again grows/rises. Further processes

in the diagram are repeated. The maximum value of current, which can be obtained in the load, is equal to the impact short-circuit current of generator.

For purposes of determination of the possibility of diagram in question and its comparison with diagram of energy storage from one impulse-excited oscillator were carried out its investigations according to equations (1), (2), (3). The investigations of the work of diagram were carried out on analog computer МНБ-1 with the use/application of a program unit, which ensures an automatic change in the block diagram of the solution with respect to changes in the diagram being investigated. The mathematical model of the diagram in question is represented in Fig. 3.

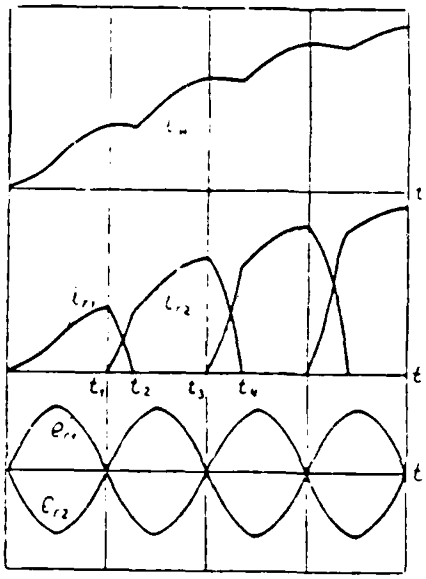

Fig. 2. Character of change in currents and emf.

Page 44.

During research on the schemes value of relation $\frac{L_H}{L_r}$ varied within the limits of 1-10. The relationships/ratios between active and inductive reactances were selected as being equal to $\frac{r_r}{x_r} = \frac{r_H}{x_H} = 0.05$ The results of these investigations are represented in Table 1.

As can be seen from represented Table, time of

reaching/achievement of current, equal to 0.9 $i_{уз}$, with work of diagram in question is more than twice less than with energy storage in inductive load from one impulse-excited oscillator. Scattering active energy in the resistors/resistances of diagram in this case will be also less than approximately two times.

Thus, with work according to this diagram more than twice grows/rises power of entire installation. Fig. 4 gives the oscillogram of the solution when $L_{н}/L_{i} = 0.5$.

Use/application of this diagram can prove to be advisable in those cases, when considerable increase in speed of transmission of energy to inductive load is necessary.

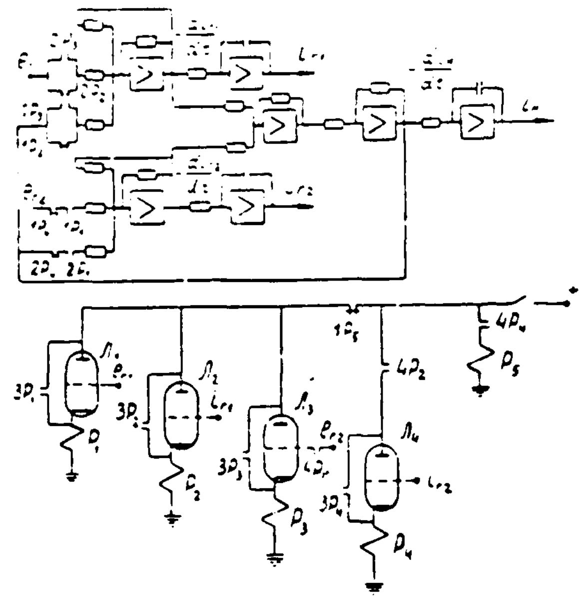

Fig. 3. Mathematical model of diagram.

Table 1.

[illegible]	1	2.5	5	[illegible]	[illegible]	(1) Примечание
[illegible]	[illegible]	[illegible]	13-	[illegible]	[illegible]	(2) Два 1 фазных генератора
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(3) Однофазный генератор

Key: (1). Note. (2). Two 1-phase generators. (3). Single-phase generator.

Page 45

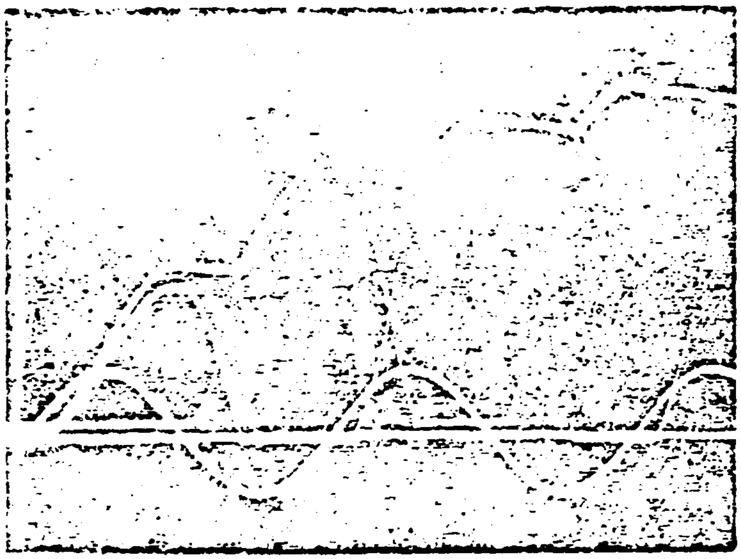

Fig. 4. Oscillogram of solution on AVM.

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